Claims

1. A method for simulating musculoskeletal strains on a patient, especially for preparing or monitoring surgical interventions and/or for planning or monitoring rehabilitation, said method comprising the following steps:

   a. Determination of individual musculoskeletal parameters of the patient, particularly by automatic measurement of anthropometric parameters, automatic derivation of anthropometric parameters from a system for computer-assisted surgery, particularly a surgical navigation system, and/or the position and/or orientation of joints;

   b. Automatic determination of the individual musculoskeletal strains from the determined musculoskeletal parameters of the patient;

   c. Computer-assisted evaluation of the individual musculoskeletal strains in respect of at least one target criterion, particularly in respect of the contact forces or the degree of movement of a joint or in respect of the fragment movements of a fracture.

2. The method as claimed in claim 1, comprising the following additional steps:

   d. Variation of at least one musculoskeletal parameter, particularly the position and/or orientation of a joint;

   e. Renewed automatic determination of the individual musculoskeletal strains taking into consideration

the at least one varied musculoskeletal parameter;

f. Renewed computer-assisted evaluation of the individual musculoskeletal strains in respect of the at least one target criterion.

3. The method as claimed in claim 2, characterized in that steps d. to f. are repeated until a specified target value of at least one target criterion is reached.

4. The method as claimed in claim 3, characterized in that the musculoskeletal parameters corresponding to the target value are output on an output unit, stored in a storage unit and/or transferred to a computer-assisted surgery system and/or to a surgical navigation system.

5. The method as claimed in claim 3 or 4, characterized in that the individual and varied musculoskeletal parameters corresponding to the target value serve as a basis for planning a surgical intervention, particularly as a basis for the choice of components, the positioning of components or the decision regarding the removal of temporary implants.

6. The method as claimed in one of claims 2 through 5, characterized in that the variation of the individual musculoskeletal parameters in step d. is carried out taking into consideration predefinable data for implants, particularly their dimensions and ranges of movement.

7. The method as claimed in one of the preceding claims, characterized in that, for the automatic determination of the individual musculoskeletal strains, the individual and the varied musculoskeletal parameters are compared with musculoskeletal reference parameters filed in a database, and musculoskeletal reference strains corresponding to the musculoskeletal reference parameters are determined as the individual musculoskeletal strains.

8. The method as claimed in claim 7, characterized in that the musculoskeletal reference parameters are present as discrete values in the database.

9. The method as claimed in claim 8, characterized in that the musculoskeletal reference parameters are compared with the individual musculoskeletal parameters by means of functional relationships, particularly by means of interpolation.

10. The method as claimed in one of the preceding claims, characterized in that the individual musculoskeletal strains are calculated from the determined individual musculoskeletal parameters.

11. The method as claimed in claim 10, characterized in that a biomechanical and/or a mathematical model is used as a basis for the calculation of the individual musculoskeletal strains.

12. The method as claimed in claim 11, characterized in that the biomechanical and/or mathematical model is adapted to the individual musculoskeletal parameters.

13. The method as claimed in claim 11 or 12, characterized in that the biomechanical and/or mathematical model is chosen on the basis of the determined individual musculoskeletal parameters from at least one database.

14. The method as claimed in one of claims 11 through 13, characterized in that the individual musculoskeletal strains are calculated with the aid of a musculoskeletal model taking into consideration the individual patient anatomy.

15. The method as claimed in one of the preceding claims, characterized in that the individual musculoskeletal strains are visualized for evaluation.

16. The method as claimed in one of the preceding claims, characterized in that the individual musculoskeletal strains are presented on the basis of an anatomical model, particularly in graph form and/or numerically.

17. The method as claimed in one of the preceding claims, characterized in that, by evaluation of the individual musculoskeletal strains, a rehabilitation process is evaluated and/or managed, particularly by means of Internet access.

18. The method as claimed in one of the preceding claims, characterized in that the individual musculoskeletal parameters of the patient are determined by measurements.

19. The method as claimed in claim 18, characterized in that at least one of the individual musculoskeletal parameters is measured automatically, particularly by image analysis, computed tomography and/or motion sensors.

20. The method as claimed in one of the preceding claims, characterized in that individual movement parameters, particularly gait parameters, are determined, and these are used for the automatic determination of individual musculoskeletal strains.

21. The method as claimed in claim 20, characterized in that the individual gait parameters are determined from personal data stored in a database and/or are recorded individually for one person.

22. The method as claimed in one of the preceding claims, characterized in that the position and/or orientation of joints are used for a navigation system for computer-assisted surgery and/or the data from a navigation system are used for computer-assisted surgery.

23. A device for evaluating musculoskeletal strains on a patient, with means for carrying out the method as claimed in one of the preceding claims.

24. A movement analysis system, in particular a gait analysis system, characterized in that it is coupled to a device as claimed in claim 23.

25. A navigation system for computer-assisted surgery for carrying out the method as claimed in claims 1 through 22.